

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A method for forming a capacitor in a semiconductor device, comprising:

forming a lower electrode constituted with a silicon oxide layer on a semiconductor substrate by a predetermined process on which a predetermined process has been completed;

forming a uniform silicon oxide layer on the lower electrode by performing an atomic layer deposition (ALD) process;

forming an aluminum oxide (Al_2O_3) film on the silicon oxide layer by using an ALD method to reduce incubation time required for the formation of the Al_2O_3 film and to remove metallic cluster formed at an interface between the Al_2O_3 film and the silicon oxide layer; and

crystallizing the Al_2O_3 film by carrying out a heat treatment process.

Claim 2 (Canceled)

Claim 3 (Original): The method as recited in claim 1, wherein the silicon oxide layer is formed by using an in-situ method or an ex-situ method.

Claim 4 (Original): The method as recited in claim 1, wherein a silicon source selected from a group consisting of SiCl_4 , DCS and HCD and a reaction source selected from a group consisting of H_2O , O_3 and H_2O_2 are used to form the silicon oxide layer during the ALD process.

Claim 5 (Original): The method as recited in claim 4, wherein a pyridine acting as a catalyst is used when the silicon source and the reaction source are supplied during the ALD process.

Claim 6 (Original): The method as recited in claim 4, wherein each of a supply time and a purge time for the silicon source and the reaction source is less than 10 seconds respectively.

Claim 7 (Currently Amended): The method as recited in claim 12, wherein the silicon oxide layer is formed at a low temperature less than about 200 °C.

Claim 8 (Original): The method as recited in claim 7, wherein a thickness of the silicon oxide layer is less than about 10 Å.

Claim 9 (Canceled)

Claim 10 (Currently Amended): The method as recited in claim 91, wherein Al (CH₃)₃, which is trimethylaluminum (TMA), is used as an aluminum source, and one of H₂O, O₃ and H₂O₂ is used as a reaction source during the ALD process to form the Al₂O₃ film.

Claim 11 (Currently Amended): The method as recited in claim 10, wherein a plasma is used as an energy source during the ALD process to form the Al₂O₃ film.

Claim 12 (Currently Amended): The method as recited in claim 11, wherein the ALD process to form the Al₂O₃ film is carried out at a room temperature or at a temperature of about 500 °C.

Claim 13 (Currently Amended): The method as recited in claim 19, wherein a thickness of the Al₂O₃ film is less than about 100 Å.

Claim 14 (Original): The method as recited in claim 1, wherein the heat treatment process is carried out at a temperature greater than 600 °C and in an N₂ or O₂ ambient.

Claim 15 (Original): The method as recited in claim 14, wherein the heat treatment process is carried out by using a furnace annealing process or a rapid thermal process (RTP).

Claim 16 (Original): The method as recited in claim 1, wherein an upper electrode constituted with a metal layer, a silicon layer or a metal layer/silicon layer is formed on an upper area of the crystallized Al₂O₃ film.